

ADDITIONAL NOTES ON NEARCTIC *BIBIO* GEOFFROY
(DIPTERA: BIBIONIDAE)

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Abstract.—Six new synonyms of Nearctic *Bibio* are presented and a former, subspecific synonym is raised to specific status. New synonyms are: *Bibio nigripilus* Loew = *B. abbreviatus* Loew; *B. painteri* James and *B. knowltoni* Hardy = *B. alexanderi* James; *B. nigrifemoratus* Hardy = *B. atripilosus* James; *B. imparalis* Hardy = *B. fluginatus* Hardy; *B. utahensis* Hardy = *B. similis* James. Variation within these species is discussed, and diagnoses and distribution are given for each. *Bibio xanthopus palliatus* McAtee is raised to specific status, and the morphological similarity of this species to *B. xanthopus* Wiedemann is discussed.

Key Words: *Bibio*, Nearctic, synonymy

Hardy (1945) provided the most recent revision of the Nearctic species of *Bibio*. Presently, 43 species are recognized (Hardy 1981, Fitzgerald 1996, Fitzgerald and Skartveit, in press).

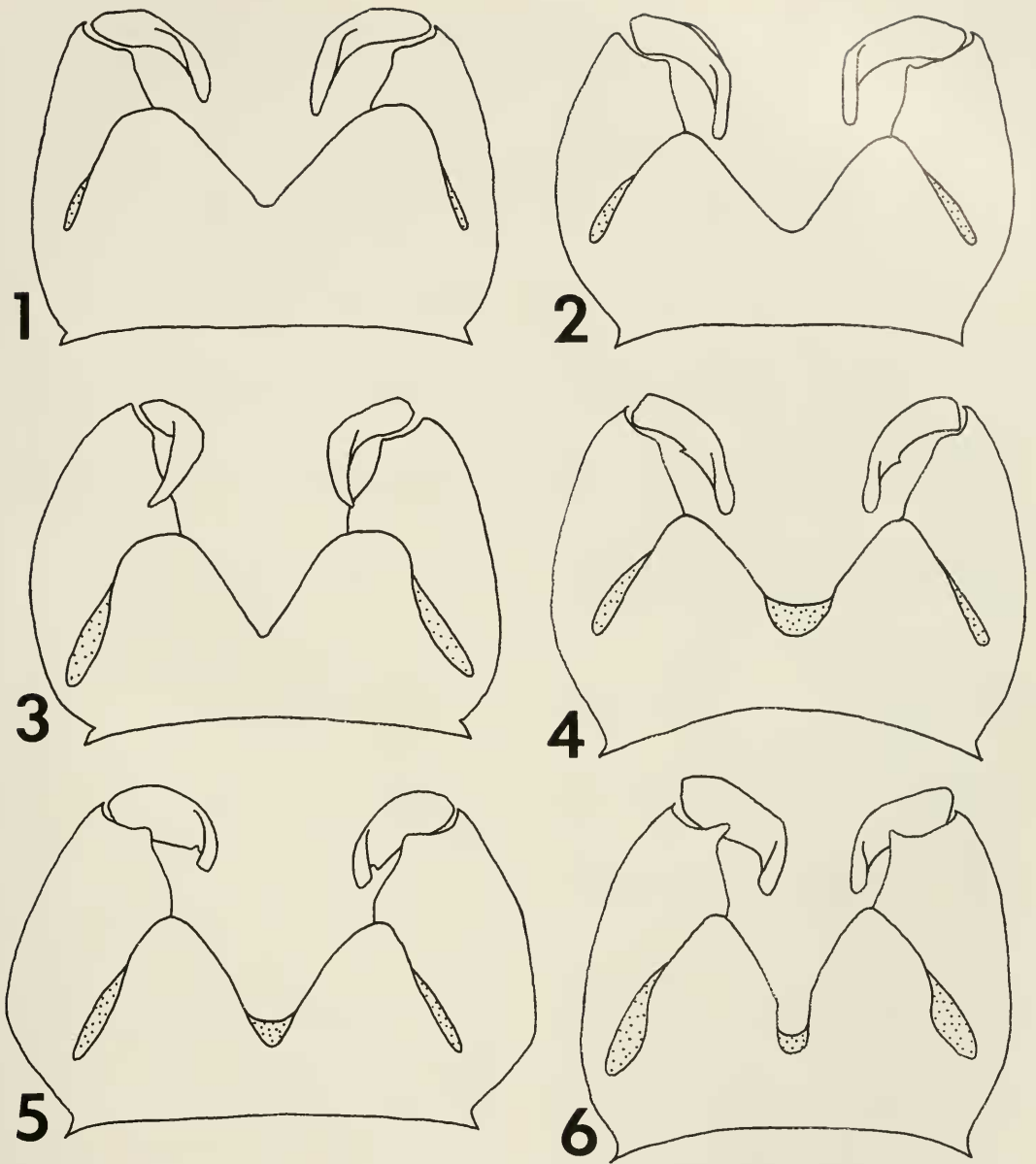
A number of species of *Bibio* are based solely on leg color and thoracic pile color, both which can be useful in combination with other characters. These characters often exhibit much intraspecific variation. The use of male terminalia, the number of sensilla of the hind tibia, relative length of the anterior spur of the fore tibia, shape of the hind tibial spur, shape and length of the hind basitarsus, length of the basal portion of Rs vein relative to r-m crossvein, and pigmentation of the posterior veins, in combination with leg and pile color, has allowed better resolution of intraspecific variation, thus resulting in the synonyms established in this paper.

The approximate number of sensilla of the hind tibia of males and some females is given for the first time for the Nearctic species discussed. Although ranges of sensilla

of some species overlap broadly, others do not, and so can provide an additional character to aid in species separation.

Sex ratio in several Palearctic *Bibio* species has been shown to be male biased (more males/female) (Skartveit 1993). Because males are more commonly collected and often provide more characters for specific separation, female records are included (under material examined for each species) only when associated with males or for species in which females are distinctive. Females of a number of species are at present, difficult, or not possible to distinguish.

Terminology follows McAlpine (1981). In diagnoses, the number of sensilla of the hind tibia is given as a range where N = number of hind tibia examined. Acronyms for specimen depositories used in this study are as follows: American Museum of Natural History (AMNH); Monte L. Bean Life Science Museum, Brigham Young University (BYU); California Academy of Sciences (CAS); Canadian National Collection, Ottawa (CNC); C. P. Gillette Museum



Figs. 1–6. Male postabdomen, dorsal view. 1, *Bibio abbreviatus*. 2, *B. fraternus*. 3, *B. alexanderi*. 4, *B. fluginatus*. 5, *B. palliatus*. 6, *B. xanthopus*.

of Arthropod Diversity, Colorado State University (CSUFC); University of Colorado (UCoLB); Museum of Comparative Zoology, Harvard (MCZ); New York State Museum, Albany (NYSM); Snow Entomological Museum, University of Kansas (UKaL); Texas A & M University (TAMU); University of Minnesota (UMSP); National Museum of

Natural History, Smithsonian Institution (USNM).

Bibio abbreviatus Loew
(Fig. 1)

Bibio abbreviatus Loew 1864: 54. Syntype male (MCZ), USA: District of Columbia, Osten Sacken; examined.

Bibio nigripilus Loew 1864: 55. Syntype male (MCZ), CANADA: Winnipeg, Ken-
nicot; examined. NEW SYNONYM.

Bibio lucens Hardy 1937: 204. Holotype male (UMSP), CANADA: Ontario, Min-
ners Bay, 26 May 1929, G.S. Walley. (syn-
onymized with *B. nigripilus* by Hardy
1945).

Discussion.—*Bibio abbreviatus* and *B. nigripilus* have historically been separated by the yellow thoracic pile in *B. abbreviatus* and black thoracic pile in *B. nigripilus* (Loew 1864, Hardy 1945, Hardy 1958). Hardy (1958) stated, "I am very skeptical of this character and doubt that it alone would be reliable." Examination of male terminalia of syntypes of both species has indicated that *B. abbreviatus* and *B. nigripilus* are conspecific. Thoracic pile color may be yellow, black or intermixed.

Diagnosis.—*Bibio abbreviatus* is most similar to *B. fraternus* Loew with which it is seasonally and geographically sympatric. However, males of *B. abbreviatus* can be separated from *B. fraternus* by the shorter hind basitarsus (see Hardy 1958: 30, Figs. 9b and 32, Fig. 12a), and the gonostylus slightly flattened (Fig. 1), rather than digitate (Fig. 2). Males of *B. abbreviatus* can be distinguished from other Nearctic *Bibio* by the combination of the following characters: Legs predominantly yellow orange; anterior spur of fore tibia three-quarters to subequal length of posterior spine; posterior basitarsus not swollen; posterior veins concolorous with membrane; hind tibial spurs slender (rather than broadly flattened); gonostylus slightly flattened (Fig. 1); epandrial cleft broadly V-shaped extending about one-half length of epandrium (Fig. 1); sensilla of hind tibia number approximately 20–200 (average = 108, N = 22).

Females of *B. abbreviatus* are most similar to *B. fraternus* but can be distinguished by the black thorax in *B. abbreviatus* and the orange yellow thorax in *B. fraternus*. Although females of *B. fraternus* usually have the thorax distinctly orange yellow,

the thorax is occasionally nearly black with only an orange tinge, and should not be mistaken for *B. abbreviatus*. Females of *B. abbreviatus* can also be distinguished by the following combination of characters: Color of legs, length of anterior spur of fore tibia, and hind tibial spurs as in male; posterior veins pigmented brown; dorsum of thorax black; sensilla of hind tibia number approximately 34–89 (N = 4).

Biology.—The flight period of this species is April and May with a few records from June. One record (UMSP) from Minnesota in October is probably incorrect. Adults have been swept from winter wheat in Indiana. Strickland (1916) reported the larvae as a celery pest and provided details of larval feeding habits and biology.

Distribution.—As in Hardy (1958), widespread in eastern United States and southeastern Canada: Ontario and Quebec, south to Georgia, Arkansas, west to South Dakota, Kansas, and Texas.

Material examined.—In addition to the types, the following material was examined: CANADA: ONTARIO: Lockburn, 18 May 1926, 2 ♂ 1 ♀ (one pair in copula) (CSUFC); USA: ARKANSAS: Crawford Co., 4 April 1927, 2 ♂ (CSUFC); KANSAS: Douglas Co., 16 April 1946, R.H. Beamer, 3 ♂ (UKaL); Gove Co., 20 April 1930, 1 ♂ 1 ♀ (CSUFC); Reno Co., Hutchinson, 2 May 1948, R.H. Beamer, 4 ♂ (UKaL); INDIANA: Tippecanoe Co., Lafayette, swept from winter wheat, 2 May, 3 ♂ (USNM); MAINE: Somerset Co., Hwy 201, 12 June 1993, Kondratieff & Baumann, 1 ♂ 1 ♀ (in copula) (CSUFC); MARYLAND: Plummers Island, 26 April 1923, H.S. Barber, 1 ♂ (USNM); MINNESOTA: Cook Co., Min. F.S., Hovland, Malaise trap, 10 October 1973, 1 ♂ (UMSP); Pine Co., Mine dump, north bank Snake River, 4 miles east of Pine City, 19 May 1951, 1 ♂ (UMSP); Pipestone Co., Pipestone National Monument, Malaise trap, 30 May 1973, 1 ♂ (UMSP); MISSOURI: May, C.V. Riley, 1 ♂ (BYU); NEW YORK: Hamilton Co.: 6 miles east of In-

dian Lake, 45°10'14", 18 May 1977, 1 ♂ (CSUFC); 10 miles east of Indian Lake, 43.45.30–74.10.14, 555 m, T.L. McCabe: 25 May 1980, 1 ♂ (NYSM); 27 May 1980, 1 ♂ (NYSM); 18 May 1977, 1 ♂ (NYSM); OHIO: Fairfield Co., 2 May 1931, J. Pattan, 1 ♂ (UMSP); PENNSYLVANIA: Centre Co., State College, 1 May 1910, 1 ♂ (USNM); TEXAS: Bandera Co., Lost Maples State Park, 22 March 1985, Kovarik, Jones & Haack, 12 ♂ 1 ♀ (TAMU); VIRGINIA: Fauquier Co., Warrenton, 5 May 1928, L.C. Woodruff, 4 ♂ (UKaL); Fairfax Co., Great Falls, 23 April 1919, 1 ♂ (USNM); Montgomery Co., near Toms Creek, Route 655, 25 April 1979, B. Kondratieff, 1 ♂ (CSUFC).

Bibio alexanderi James
(Fig. 3)

Bibio alexanderi James 1936: 1. Holotype female (AMNH), USA: Colorado: Boulder Creek bottoms near Valmont, 24 April 1934, E. Gordon Alexander; examined.

Bibio painteri James 1936: 2. Holotype female, allotype male (same pin) (AMNH), USA: Kansas, Manhattan, 19 April 1932, R.H. Painter; examined. **NEW SYNONYM.**

Bibio knowltoni Hardy 1937: 202. Holotype male (BYU), USA: Utah, Granger, on *Lepidium*, 29 April 1931, G.F. Knowlton; not examined. **NEW SYNONYM.**

Bibio knowltoni var. *paltidus* Hardy 1937: 203. Holotype male (BYU), USA: Utah, Provo, 8 May 1937, D.E. Hardy. (synonymized with *B. knowltoni* by Hardy 1965).

Discussion.—The holotype female, allotype male (AMNH) and two female paratypes (CSUFC) of *B. alexanderi*, the holotype female, allotype male (AMNH), and five paratypes (two pair in copula) (CSUFC) of *B. painteri*, four male paratypes (USNM) of *B. knowltoni*, and six male paratypes (USNM) of *B. k. paltidus* were examined and found to be conspecific. In contrast to the rounded apex of the gono-

stylus in many Nearctic *Bibio*, the gonostylus of *B. alexanderi* is apically acute in dorsal view (Fig. 3). Previously, males of *B. alexanderi*, *B. painteri* and *B. knowltoni* were separated by minor differences in leg color and pile color of the eyes and tibiae (James 1936, Hardy 1945). Females were separated by the entirely orange yellow dorsum of the thorax in *B. alexanderi*, with black markings in *B. painteri*, and entirely black in *B. knowltoni*. Individual females from single populations can exhibit this range of thoracic color.

Hardy (1945) distinguished *B. carri* Curran from *B. alexanderi* by the position of a transverse depression separating the upper and lower portion of the compound eye. In *B. carri* this depression is just below middle line, and in *B. alexanderi* it is near the lower one-fourth. A topotypic male of *B. carri* (CSUFC) has been examined and is similar to *B. alexanderi* in all respects, including male terminalia, with the exception of the position of the transverse depression on the eye. However, since the two species are apparently allopatric (*B. carri* known only from Alberta, Canada), and the unique position of the transverse depression of the eye in *B. carri* is not present in any populations of *B. alexanderi* examined, *B. alexanderi* and *B. carri* are recognized as distinct species.

Diagnosis.—Males of *B. alexanderi* are most similar to *B. carri*, but can be separated by the position of the transverse depression of the compound eye (see discussion). The most diagnostic character of *B. alexanderi* is the broadly flattened hind tibial spur which will distinguish both males and females from the similar *B. abbreviatus*, *B. xanthopus*, and *B. atripilosus*. Additional characters to distinguish males of *B. alexanderi* are: Legs predominantly yellow orange, sometimes with brown markings; anterior spur of fore tibia one-third to slightly over one-half length of posterior spine; hind basitarsus not swollen, shorter (less than four times as long as wide) than in *B. xanthopus* Wiedemann; hind tibial

spurs broadly flattened and usually apically rounded; posterior veins darker than membrane; transverse depression separating the upper and lower portion of the compound eye near the lower one-fourth of the eye; gonostylus apically acute in dorsal view (Fig. 3); sensilla of hind tibia number approximately 34–78 ($N = 33$).

Females of *B. alexanderi* are diagnosed by the length of the anterior spur of the fore tibia and hind tibial spur as in the male; thoracic color ranges from black to orange yellow to orange yellow with black markings; sensilla of hind tibia number approximately 34–56 ($N = 6$).

Biology.—The flight period is March to early July, with most records from March and April. Pairs in copula have been taken in April in Arizona and Colorado. Adult collection records are from *Lindheimera texana* (Asteraceae) in Texas, and on *Medicago sativa* L. (alfalfa: Fabaceae), *Lepidium* sp. (Brassicaceae), and *Descurainia sophia* (L.) (Brassicaceae) in Utah. It was reported as a nuisance pest in Denver Co., Colorado from a bluegrass lawn in late April. The use of a sprinkler system apparently triggered a mass emergence of the flies (10–15 insects per blade of grass) (personal communication).

Distribution.—Southwestern United States: Arizona, California, Colorado, Kansas, New Mexico, Oklahoma, Texas, and Utah. Hardy (1945) listed *B. painteri* from Ohio.

Material examined.—In addition to the type material, the following material was examined: USA: ARIZONA: Gila Co., Globe, 5 April 1937, Parker, 3 ♂ 1 ♀ (one pair in copula) (USNM); Maricopa Co., Phoenix, 8 March 1945, F.H. Parker, 1 ♂ (USNM); CALIFORNIA: Los Angeles Co., Glendora, Dalton Canyon, 15 March 1929, E.G. Anderson, 1 ♂ (UMSP); COLORADO: Denver Co., Thorton, lawn, 26 April 1994, C. Wilson, 4 ♂ 3 ♀ (CSUFC); Yuma Co., Chief Creek, road CC N., 25 April 1993, S. Fitzgerald, 2 ♂ (CSUFC); KANSAS: Sedgwick Co., Wichita, 18 April

1917, 1 ♂ (USNM); NEW MEXICO: Dona Ana Co., Las Cruces, N.M.S.U., 13 March 1994, R. Durfee, 1 ♂ (CSUFC); OKLAHOMA: Alfalfa Co., 12 April 1931, 2 ♂ (AMNH); Cleveland Co., Norman, 13 March 1931, 9 ♂ 2 ♀ (AMNH); Stephens Co., Comanche, 12 April 1952, Michener, Beamers, Wille & LaBerge, 5 ♂ 2 ♀ (1 ♂ taken on *Lindheimera texana*) (UKaL); TEXAS: 12 March 1900, 1 ♂ 2 ♀ (USNM); Travis Co., Austin, 9 March 1900, 4 ♂ 4 ♀ (USNM); UTAH: Grand Co., Colorado River, highway 163 north of Moab, 23 April 1982, Baumann & Clark, 3 ♂ (in alcohol) (BYU); Washington Co.: North Fork Virgin River, Temple of Sinawara, Zion National Park, 30 March 1981, Baumann & Stranger, 3 ♂ (in alcohol) (BYU); Emerald Pools, Zion National Park, 8 April 1983, Baumann, 1 ♂ (in alcohol) (BYU); Utah Co., Provo, Environs., D.E. Hardy, 1 ♂ (BYU).

Bibio atripilosus James

Bibio atripilosus James 1936: 2. Holotype male (AMNH), USA: Colorado, Boulder, 5 May 1934, M.T. James; examined.

Bibio nigrifemoratus Hardy 1937: 206. Holotype male and allotype female (CNC), CANADA: British Columbia, Monte Lake, 13 May 1936, J.K. Jacob; examined. **NEW SYNONYM.**

Bibio nigrifemoratus var. *gilvus* Hardy 1937: 206. Holotype male (USNM), USA: Utah, Hyrum, 1 May 1937, G.F. Knowlton, F.C. Harmston; examined. (synonymized with *B. nigrifemoratus* by Hardy 1961).

Discussion.—The holotype (AMNH) and four male paratypes (CSUFC) of *B. atripilosus*, the holotype of *B. n. gilvus*, and the holotype, allotype (CNC) and six paratypes (BYU) of *B. nigrifemoratus* were examined and found to be conspecific. The shape of the gonostylus of the male is distinct from all other Nearctic *Bibio* (see Hardy 1961: 185, Fig. 6c). Characters historically used to separate *B. atripilosus* and *B. nigrife-*

moratus (Hardy 1945), such as thoracic pile color, wing length, and length of the anterior spur of the fore tibia, vary intraspecifically. *Bibio nigrifemoratus* was described with black pile, and *B. atripilosus* described with a wing length of 7 mm. In males of this species thoracic pile color ranges from yellow to black, the wing length ranges from 4–6 mm, and the length of the anterior spur of the fore tibia is one-fifth to one-third the length of the posterior spine.

Of the two paratypes of *B. nigrifemoratus* that Hardy (1937) listed from Kiger's Island, Oregon (Benton Co.), one has been examined. This specimen is not *B. nigrifemoratus*, but *B. similis* James, differing in the longer anterior spur of the fore tibia and the simple, digitate rather than uniquely shaped gonostylus (see Hardy 1961: 185, Fig. 6c). The second paratype specimen from Kiger's Island, Oregon is also probably *B. similis*.

Diagnosis.—Males of *B. atripilosus* are most similar to *B. xanthopus*, but can be distinguished by the unique shape of the gonostylus (see Hardy 1961: 185, Fig. 6c). Males can be distinguished from all other Nearctic *Bibio* by the following combination of characters: Anterior spur of fore tibia short, one-fifth to one-third length of posterior spine; hind basitarsus not swollen; posterior veins darker than membrane; hind tibial spurs slender (rather than broadly flattened); sensilla of hind tibia number approximately 15–50 ($N = 13$); gonostylus distinct (see Hardy 1961: 185, Fig. 6c).

Biology.—The flight period is April to June, with most records in April and May. Collections have been made at elevations of 610–1830 m.

Swarms of 5–15 males, 0.30–0.61 m off the ground, have been observed in an open ponderosa pine forest (elevation $\approx$ 1830 m) along the Front Range in northern Colorado. Swarms were generally oriented over rocks, and when clouds temporarily blocked direct sunlight, individuals would land on rocks or adjacent vegetation. With the return of direct sun, swarming would

resume. Copulating pairs have been observed in April and May. In one case, two males attempted to copulate, and simultaneously displaced each other from one female.

Distribution.—Northwestern United States and extreme southwestern Canada: British Columbia, California, Colorado, Idaho, Montana, Utah, and Washington.

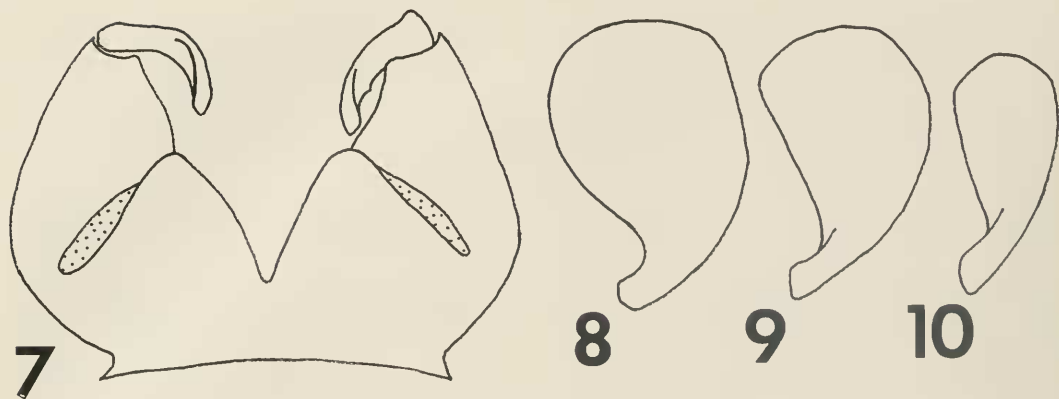
Material examined.—In addition to type material, the following material was examined: CANADA: BRITISH COLUMBIA: Robson, 26 May 1936, Foxlee, 2 ♂ (USNM); USA: CALIFORNIA: Cuyamaca, 17 May 1948, 1 ♂ (USNM); COLORADO: Boulder Co.: 5 May 1934, M.T. James, 1 ♂ (CSUFC); one mile southwest of Boulder, 6000 ft., 25 April 1963, U.N. Lanham, 3 ♂ (UColB); Boulder, 24 April 1971, U.N. Lanham, 3 ♂ (UColB); Larimer Co., Horsetooth Reservoir, ridge north of Spring Creek Dam, 24 April 1995, S. Fitzgerald & A. Foley, 25 ♂ 5 ♀ (two pairs in copula) (CSUFC); IDAHO: Boise Co., Warm Spring Creek junction South Fork Payette River, highway 21, 23 April 1984, Baumann & Nelson, 1 ♂ (BYU); UTAH: Carbon Co., Minnie Maude Creek junction Nine Mile Creek, 1 April 1978, Baumann & Winget, 1 ♂ (BYU); WASHINGTON: Stevens Co., Kettle Falls, 3 May 1912, 3 ♂ (USNM); Whitman Co.: Pullman, J.A. Hyslop, 25 ♂ (USNM); Pullman, 2000–2500 ft., 13 April 1991, P. McLellan, 1 ♂ (CSUFC).

Bibio fluginatus Hardy
(Fig. 4)

Bibio fluginatus Hardy 1937: 201. Holotype male (USNM), CANADA: British Columbia, Salmon Arm, 13 May 1933, Hugh Leech; examined.

Bibio imparalis Hardy 1959: 209. Holotype male (CAS), USA: California, Mariposa Co., Yosemite Valley, 21 May 1921, E.C. Van Dyke; not examined. NEW SYNONYM.

Discussion.—The descriptions of *B. fluginatus* and *B. imparalis* are nearly identi-



Figs. 7–10. Male postabdomen. 7, *Bibio similis*, dorsal view. 8–10, Right gonostylus, posterior view. 8, *B. palliatus*. 9, *B. xanthopus*. 10, *B. similis*.

cal. Neither relationships nor diagnostic characters were given by Hardy (1959). The male terminalia of the holotype male of *B. fluginatus* and a topotypic male paratype of *B. imparalis* (USNM) have been examined and are found to be conspecific. The holotype of *B. fluginatus* is missing the hind legs, which have important characters for species separation, but Hardy (1937) provided a good original description of the hind legs.

Diagnosis.—Males of this small species of *Bibio* are most similar to *B. atripilosus*, but can be distinguished by the simple digitate gonostylus rather than the uniquely shaped gonostylus of *B. atripilosus* (see Hardy 1961: 185, Fig. 6c). Males can also be distinguished by the following combination of characters: Legs yellow orange; anterior spur of fore tibia one-fourth to one-third length of posterior spine; wing 4 mm, posterior veins darker than membrane; hind basitarsus slightly swollen; hind tibial spurs slender; antennal flagellum five segmented; sensilla of hind tibia number approximately 78–98 ($N = 3$); in dorsal view gonostylus broadly rounded apically (Fig. 4); epandrial cleft about two-thirds length epandrium, broadly V-shaped, usually with a U-shaped notch anteriorly (Fig. 4).

Biology.—All known specimens were collected in May.

Distribution.—Very few specimens are

available for study. The known range presently includes California, British Columbia, and Utah.

Material examined.—Both species were previously known only from the types. In addition to the type material listed above, the following specimen was examined: USA: UTAH: Summit Co., Yellow Pine Campground, 27 May 1980, R. Shaha, 1 ♂ (BYU).

Bibio palliatus McAtee, New Status
(Figs. 5, 8)

Bibio xanthopus palliatus McAtee 1922: 16. Holotype male, allotype female (same pin) (USNM), USA: Idaho, Moscow, 7 May 1894; examined.

Bibio signatus Hardy 1937: 208. Holotype male (BYU), USA: Utah, Spanish Fork, 29 April 1936, D.E. Hardy; examined. (synonymized with *B. palliatus* by Hardy 1945).

Discussion.—*Bibio x. palliatus* was originally described by McAtee (1922) as a subspecies of *B. xanthopus* Wiedemann (1828: 80) for those specimens differing from “typical” *xanthopus* by the coloration of the legs and thoracic pile, and relative size. Hardy (1937) described *B. signatus* as a distinct species, later synonymized it with *B. x. palliatus* (Hardy 1945), and eventually considered both as synonyms of *B. xantho-*

pus (Hardy 1965). Examination of the terminalia of male holotypes of *B. signatus* and *B. x. palliatus*, as well as many specimens of *B. xanthopus*, indicates that *B. palliatus* should be considered a distinct species. Females of the two species are presently indistinguishable.

Although the type of *B. xanthopus* is a female (Hardy 1967), the identity of this species cannot be mistaken for *B. palliatus* due to geographic proximity. *Biblio xanthopus* was described from New York and is widespread throughout the United States (as Hardy 1945), whereas *B. palliatus* is restricted to the northwestern United States and southwestern Canada.

Hardy (1945) provided some characters for the separation of the larvae of *B. xanthopus* and *B. palliatus*.

Diagnosis.—Males of *B. palliatus* are most similar to *B. xanthopus* and *B. similis* James, but can be distinguished by the apical portion of the gonostylus very short in dorsal view (Fig. 5) and the basal portion of the gonostylus broadly rounded in posterior view (Fig. 8), whereas *B. xanthopus* and *B. similis* have the apical portion of the gonostylus more elongate in dorsal view (Fig. 6 and 7) and the basal portion of the gonostylus more slender in posterior view (Figs. 9 and 10). Males of *B. palliatus* can also be distinguished by the following combination of characters: Anterior spur of fore tibia one-half to two-thirds (usually just over one-half) length of posterior spine; posterior veins darker than membrane; hind tibial spur slender; gonostylus with distal portion very short in dorsal view (Fig. 5), and broadly rounded basally in posterior view (Fig. 8 and also Hardy 1961: 187, Fig. 7c; this figure is under the name *B. utahensis* (see discussion of *B. similis*)); hind basitarsus not swollen, elongate, robust; sensilla of hind tibia number approximately 21–88 (N = 24).

Variation.—The leg color is extremely variable, ranging from orange yellow with dark joints, to entirely black, to dark brown to black with base of hind femur yellow, to

entirely orange yellow with dark joints and the apical three-quarters of the hind tibia brown black and tarsi brown black, to the hind femur black and the tibia and tarsi brown orange. Although McAtee (1922) described *B. palliatus* as having “somewhat greater average size”, wing length ranges from about 5–8 mm, which broadly overlaps the range of wing length of *B. xanthopus*. The r-m crossvein ranges from one-third to equal the length of the base of Rs.

Biology.—The flight period is March–June, with most records in April and May. Adults have been collected from wetlands in Utah and along streams, rivers, lakes, reservoirs, ponds, and springs in other areas of the West, which would suggest that moist or saturated soils are the preferred larval habitat. However, adults have also been collected from sand dunes with vegetation in Washington. Specimens have been taken at elevations of 610–762 m in Washington and approximately 1525 m in Colorado.

Distribution.—Northwestern United States and southwestern Canada: Alberta, British Columbia, California, Colorado, Idaho, Montana, Nevada, Oregon, western South Dakota, Utah, Washington, and Wyoming.

Material examined.—In addition to the type material, the following material was examined: CANADA: ALBERTA: Belly River Campground, Waterton Lakes National Park, 22 May 1993, Baumann & Liu, 1 ♂ (BYU); North Willow Creek, highway 22, 28 May 1993, Baumann & Liu, 3 ♂ (BYU); USA: CALIFORNIA: Nevada Co., Bear River, highway 20, Placer Co. line, 21 April 1987, Baumann, Nelson & Wells, 1 ♂ (in alcohol) (BYU); COLORADO: Larimer Co., Dixon Reservoir, 14 May 1994, B.C. Kondratieff, 2 ♂ (CSUFC); IDAHO: Nez Perce Co., Mission Creek, highway 95, 2 miles west of Culde Sac, 27 April 1985, Baumann & Nelson, 1 ♂ (BYU); MONTANA: Glacier Co., South Fork Cut Bank Creek, highway 89 north of Kiowa, 22 May 1993, Baumann & Liu, 5 ♂ (BYU); TETON Co., North Fork Sun River, highway 287

north of Augusta, 21 May 1993, Baumann & Liu, 1 ♂ (BYU); OREGON: Multnomah Co., Wahkeena Creek at Wahkeena Falls, 29 March 1984, G.R. Fiala, 1 ♂ (in alcohol) (BYU); Umatilla Co., Wildhorse Creek at Athena, 25 April 1985, Baumann & Nelson, 3 ♂ (in alcohol) (BYU); Wallowa Co., Rock Creek, highway 82, 3 miles northwest of Wallowa, 19 May 1977, Baumann & Dunster, 4 ♂ 8 ♀ (in alcohol) (BYU); SOUTH DAKOTA: Custer Co., Iron Creek, Dakota Lake, 5 June 1995, Baumann & Huntsman, 1 ♂ (BYU); Pennington Co.: spring at Whitewood Creek, 7 June 1995, Baumann & Huntsman, 4 ♂ (BYU); Iron Creek, Spearfish Canyon, 7 June 1995, Baumann & Huntsman, 1 ♂ (BYU); UTAH: Washington Co., Santa Clara River, headwaters, North Juniper Campground, 26 May 1976, Baumann, 1 ♂ (in alcohol) (BYU); Utah Co.: Powell Slough, 8 May 1980, S.M. Clark, 4 ♂ (CSUFC); Lehi Environs., 4 May 1968, W. Clark, 1 ♂ (BYU); Provo, 26 May 1955, 1 ♂ (BYU); South Fork of Provo Canyon, Agnes Hardy, 1 ♂ (this specimen is part of the paratype series of *B. utahensis* Hardy) (BYU); Provo, 26 April 1958, S.K. Taylor, 2 ♂ (BYU); Goshen Pond, 8 May 1973, S.B. Shurtleff, 1 ♂ (BYU); Goshen Springs, 1 May 1965, W.M. Tingey, 1 ♂ (BYU); wetland west of Utah Valley State College, 4 May 1996, R.W. Baumann, 14 ♂ 1 ♀ (BYU), 14 ♂ 1 ♀ (CSUFC); Provo, Environs, L.E. Perry, 7 ♂ (BYU); Provo, Environs, 6 May 1969, 1 ♂ (CSUFC); WASHINGTON: Benton Co., Hanford Site, sand dunes with vegetation near Hanford townsite, T12N R28E Section 5, 20 April 1994, R.S. Zach, 5 ♂ 1 ♀ (CSUFC); King Co.: Seattle, 10 April 1933, 1 ♂ (CSUFC); Fall City, 14 April 1970, D.R. Harris, 1 ♂ 1 ♀ (CSUFC); Kittitas Co., Yakima River, highway 90, Cle Elum, 6 May 1982, Baumann & Smith, 1 ♂ 1 ♀ (in alcohol) (BYU); Whitman Co.: Pullman, April, 2 ♂ (USNM); Pullman, 2000–2500 ft., 20 April 1991, P. McLellan, 1 ♂ 1 ♀ (CSUFC); Pullman, May 1921, 2 ♂ (CSUFC); Pullman, 8 May 1931, 1 ♂

(CSUFC); WYOMING: Crook Co., Belle Fourche River at Hulett, 8 June 1995, Baumann & Huntsman, 2 ♂ (BYU); Niobrara Co., Quinn Creek, highway 20 at Lusk, 2 June 1995, Baumann & Huntsman, 4 ♂ 2 ♀ (BYU).

Bibio similis James

(Figs. 7, 10)

Bibio similis James 1936: 5. Holotype male (AMNH), USA: Colorado, Boulder, 5 May 1934, M.T. James; examined.

Bibio utahensis Hardy 1937: 208. Holotype male (BYU), USA: Utah, Utah Co., Provo environs., Harry Thomas; examined.
NEW SYNONYM.

Discussion.—The holotype of *B. utahensis* is conspecific with *B. similis*. However, the paratype series of *B. utahensis* is composed of two species, *B. similis* and *B. palliatus*, only separable by examination of male terminalia. Hardy (1961) illustrated (p. 187, Figs. 7a–7c) the male terminalia and hind and fore tibia of *B. palliatus* under the name *B. utahensis*.

Diagnosis.—Males of *B. similis* are most similar to *B. xanthopus* and *B. palliatus*. Males of *B. similis* can be distinguished from *B. xanthopus* by the longer anterior spur of the fore tibia, legs usually dark brown to black, and the more slender base of the gonostylus in posterior view (compare Figs. 9 and 10). *Bibio similis* can be distinguished from *B. palliatus* only by examination of male terminalia; the gonostylus of *B. palliatus* is robust and broadly rounded basally in posterior view (Fig. 8) with a very short apical portion in dorsal view (Fig. 5), whereas the gonostylus of *B. similis* is slender basally in posterior view (Fig. 10) with the apical portion in dorsal view, not shortened, but developed into a longer, simple, digitate process with a blunt apices (Fig. 7). Males of *B. similis* can also be distinguished by the following combination of characters: Legs predominantly black (see variation below); anterior spur of fore tibia one-half to three-fourths length of

posterior spine; posterior veins darker than membrane; hind basitarsus not swollen; hind tibial spur slender; sensilla of hind tibia number approximately 21–51 ($N = 18$); gonostylus basally slender and distally elongate (Figs. 7 and 10).

Variation.—In males thoracic pile color ranges from yellow to black to intermixed, and the legs range in color from black to dark brown to the femora blackish and the tibia and tarsi brown orange.

Although *B. similis* was originally described with the anterior spur of the fore tibia not being over one-fourth the length of the posterior spine, a study of the holotype, paratypes, and additional material, reveals that the anterior spur ranges from one-half to three-fourths the length of the posterior spine.

Biology.—The flight period is April and May. It has been taken on flowers of *Salix* (Salicaceae) in Colorado. Adults seem to be most commonly collected along creeks, ponds, and rivers, and the larvae may prefer moist or saturated soils.

Distribution.—Northwestern United States: Colorado, Oregon, Western South Dakota, Utah, and Washington.

Material examined.—In addition to the types, the following material was examined: USA: COLORADO: Boulder Co., Sawhill Ponds, 14 May 1994, B. Kondratieff & R. Durfee, 12 ♂ 6 ♀ (one pair in copula) (CSUFC); Delta Co., 5 miles northeast of Delta off highway 65, 3 May 1987, U.N. Lanham & M. Weissmann, 1 ♂ (CSUFC), 6 ♂ (UColB); Douglas Co., 5 miles southeast of Franktown, *Salix* flowers, 26 April 1963, U.N. Lanham, 1 ♂ (UColB); Garfield Co., Grizzly Creek, 9 May 1995, W. Cranshaw, 4 ♂ 1 ♀ (CSUFC); Larimer Co., N. Colorado Nature Center, 25 May 1987, B.C. Kondratieff, 1 ♂ (CSUFC); OREGON: Umatilla Co.: Umatilla River at Mission, 5 miles east of Pendleton, 25 April 1985, Baumann & Nelson, 2 ♂ (in alcohol) (BYU); Walla Walla River in Milton-Free-water, 25 April 1985, Baumann & Nelson, 1 ♂ (in alcohol) (BYU); Union Co., Phillips

Creek, highway 82, Elgin, 19 April 1977, Baumann, 1 ♂ (in alcohol) (BYU); Walla Walla Co., Rock Creek, highway 82, 3 miles northwest of Wallowa, 19 May 1977, Baumann & Dunster, 1 ♂ (in alcohol) (BYU); SOUTH DAKOTA: Lawrence Co., Whitewood Creek between junction Yellow and White Tail Creeks (WW-09), 19 May 1981, Baumann & Furnish, 1 ♂ (in alcohol) (BYU); UTAH: Cache Co., Blacksmith Fork Canyon, 21 May 1983, C.R. Nelson, 1 ♂ (BYU); Utah Co.: East side Utah Lake: 10 ♂ (BYU); V.M. Tanner, 3 ♂ (CSUFC); 20 April 1957, H.P. Shurtleff, 1 ♂ 1 ♀ (CSUFC); Wasatch Co., spring tribs. of Provo River near Hoovers, 14 May 1987, Nelson & Wells, 1 ♂ (BYU); WASHINGTON: Kittitas Co., Teanaway River, highway 10, 4 miles south of Cle Elum, 6 May 1982, Baumann & Smith, 5 ♂ (in alcohol) (BYU).

ACKNOWLEDGMENTS

I sincerely thank Paul H. Arnaud Jr., California Academy of Sciences; Richard W. Baumann, Monte L. Bean Life Science Museum, Brigham Young University; Leslie C. Costa, Museum of Comparative Zoology, Harvard University; Jeff M. Cumming, Canadian National Collection of Insects, Ottawa; David Grimaldi and Julian Stark, American Museum of Natural History; and F. Christian Thompson, Systematic Entomology Laboratory, USDA, for the loan of types and critical material. My visit to the United States National Museum of Natural History was supported by the Samuel Wendell Williston Diptera Research fund. Special thanks are also due to Boris C. Kondratieff, C. P. Gillette Museum of Arthropod Diversity, Colorado State University, for his continual support of my research and critical review of the manuscript.

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